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ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043

EXAMINER	
CHENG, PETER L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/759,052	LIN, TA-WEI	
	Examiner	Art Unit	
	PETER L. CHENG	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's amended specifications filed on **4/8/2008** and **10/21/2008** have not been entered.

Specification

2. The amendment filed **4/8/2008** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

- **Page 28 (**of the reply filed **4/8/2008), lines 1 - 3:** the original disclosure on **page 7, line 5** cited,

  “Step 119: summing and averaging.”;

however, the amended specification currently cites,

"Step 119: summing *the R.G.B. values respectively converted from the data read from the white region and the color region of the calibration chart 16,* and *further* averaging *the R.G.B. values thereof.*";

the added material, shown underlined, is not supported by the original disclosure;

*please note that the added material shown underlined is also contained in the "Substitute Specification" filed on **10/21/2008**.*

In the reply filed **10/21/2008**, Applicant submits that "*support for the amendment to step 119 of the exemplary method can be found on **page 8, line 2 – page 9, line 3** of the application as originally filed. Specifically, this passage provides support and (exemplary formulas) for summing and averaging the R.G.B. values for the data read from the calibration chart 16*".

However, this cited portion of the original disclosure appears directed to "step 121" instead of "step 119". For example, **page 8, line 2** recites, "In the step 121 …".

In addition, this cited portion of the original disclosure does not mention "*summing the R.G.B. values respectively converted from the data read from the white region and the color region of the calibration chart 16, and further averaging the R.G.B. values thereof*".

This cited portion of the original disclosure <u>does teach</u> summing "(r, g, b) *real values*" in equations (1), (2) and (3). However, the summations shown in equations (1), (2) and (3) do not correspond to "*summing R.G.B. values <u>respectively converted from the data read from the white region and the color region of the calibration chart 16</u>*". The summations shown in equations (1), (2) and (3) add "real (i.e., actual) values" *<u>which are not read, and therefore, are not converted from the data read from either the white or color regions of the calibration chart 16</u>*.

Lastly, this cited portion of the original disclosure does not teach "averaging of the R.G.B. values thereof".

3. The amendment filed **4/8/2008** is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

- **Page 28 (**of the reply filed **4/8/2008), lines 6 - 8:** the original disclosure on **page 7, line 8** cited,

  "Step 123: scanning and compensating.";

  however, the amended specification currently cites,

  "Step 123: *then the color image scanning system processes* scanning and compensating *the scanned image* <u>*referring to the summed R.G.B. value and averaged R.G.B. value.*</u>";

  the added material, shown underlined, is not supported by the original disclosure;

  in addition, the disclosure does not teach how the compensation uses the summed and averaged values;

  please note that the added material shown underlined is also contained in the "Substitute Specification" filed on ***10/21/2008****.*

In the reply filed **10/21/2008**, Applicant submits that "*support for the amendment to step 123 of the exemplary method can be found on* ***page 9, lines 4 – 7*** *of the application as originally filed. Specifically, an exemplary formula using the summed and average[d] RGB values are provided*".

However, the equation shown on **page 9, line 7** illustrates the calculation of "real (r, g, b) values" from "sensed (R, G, B) values". The term "real values" is understood as meaning "actual values", and the term "sensed values" is understood as meaning "measured values" or values which are read by an image sensor. It is further understood that this equation refers to the step of "*compensating the scanned image*".

However, as noted for the objection to step 119 above, the original disclosure does not teach "*summing of the R.G.B. values respectively converted from the data read from the white region and the color region of the calibration chart 16*" nor does it teach "*averaging of the R.G.B. values thereof*".

Applicant is required to cancel the new matter in the reply to this Office Action.

4. The originally-filed abstract of the disclosure is objected to because:

- **Line 2:** suggest replacing "colorful calibration chart" with "color calibration chart";

- **Line 5:** suggest replacing "the parameter" to "a parameter";

- **Line 8:** suggest replacing "in a predetermined level" to "at a predetermined

level”;

Correction is required. See MPEP § 608.01(b).

5. The disclosure is objected to because of the following informalities:

- **Page 15 (**of the reply filed on **10/21/2008), 1st paragraph:** suggest replacing **This Application Is A** with **This application is a**;

- **Page 9 (**of the original specification**), line 8:** as with the suggestion made for the abstract, suggest replacing “correct *colorful* image” with “correct color image”;

- The following **page** and **line** numbers refer to the original specification; the applicant may choose to implement the following suggestions; for example, **page 1, line 4 (**change “U.S. application” to “U.S. patent application”**); page 1, line 5 (**change “filed on 1 Sept. 2000 and” to “filed on 1 Sept. 2000, now abandoned and”**); page 1, lines 5 – 6 (**change "method for calibrating color image scanners" to "Method for Calibrating Color Image Scanners"**); page 2, line 6 (**change “normal image” to “conventional image”**); page 2, line 7 (**change “while color” to “white color”**); page 2, lines 9 – 10 (**change “Therefore, it is easily to adjust …” to “Therefore, one can easily adjust …”, or similar wording**); page 2, line 11 (**change “of related” to “of the related”**);**

page 2, line 15 (change “In some extent” to “To an extent” or “To some extent”, or similar wording**); page 2, line 17 (**suggest re-writing “the error for each primitive color can’t be response correctly”**); page 2, line 18 (**change “even a color” to “even when a color"**); page 2, line 19 (**change “of output” to “of the output”**); page 3, lines 7 - 8 (**change “the parameter” to “a parameter”**); page 3, line 11 (**change “in a” to “at a”**); page 3, line 22 (**change “the parameter” to “a parameter”**); page 4, line 2 (**change “in a” to “at a”**); page 4, line 20 (**change “complied with” to “in compliance with”, or remove “complied”**); page 4, line 21 (**change “a operative” to “an operative”**); page 5, line 21 (**change “tree” to “three”**); page 5, lines 24 – 25 (**change “are not necessary to be” to "need not be"**); page 5, line 25 (**change “not necessary to be” to “need not be"**); page 6, line 13 (**change “complied with” to “in compliance with”, or remove “complied”**); page 7, line 5 (**for clarity, it is suggested that “summing and averaging” be modified to include what is being summed-up and averaged**); page 7, line 6 (**change “calculating averaged compensating value for scanning” to “calculating an averaged compensating value for scanning as described in more detail below”, or similar wording”**); page 7, line 8 (**for clarity, it is suggested that “scanning and compensating” be modified to include what is being scanned (e.g., “an image”) and compensated (e.g., “the converted RGB data”)**); page 7, line 9 (**change “a operative” to “an operative”**); page 7, line 11 (**change “and current” to “and the current”**); page 7, line 13 (**change “includes following” to “includes the

following”**); page 7, line 15 (**change “If positive” to “If it exceeds”**); page 7, line 20 (**change “If positive” to “If v is in the maximum region”**); page 8, lines 5 – 6 (**change “That results from properties of filter lens or light source” to “This is due to the properties of the filter lens or the light source”, or similar wording**); page 8, lines 6, 10, 17 (**change “sensing values” to “sensed values”**); page 8, line 17 (**change “of black color” to “of the color black”**); page 8, line 16 (**change “real colors, C1, C2, C3 …” to “real colors, and C1, C2, C3 …”**); page 8, line 17 (**change “(these values are the sensing values of black color)” to "when the real color is black”, or similar wording**); page 9, line 5 (**change “reverse” to “inverse”**);**

- **Page 7, lines 11 - 12:** it’s not clear why the parameter “d” is referred to as an “adjusted *volume*”; perhaps, a different term should be used; for example, the parameter "d" appears to be a "gain adjustment value";

Appropriate correction is required.

Claim Objections

6. Claim 1 is objected to because of the following informalities:

- **Line 11:** “each pixel” lacks antecedent basis;

- **Line 15:** it is not clear whether **the gain value** refers to **a current gain value** cited in **claim 1, line 10** or <u>*some other value*</u>;

  however, per the original disclosure, **page 7, lines 19** and **22 – 23**, it is clear that "**the gain value**" refers to **the value d** and not **a current gain value** cited in **claim 1, line 10**;

  from **claim 1, lines 10** and **12**, it is also clear that **the adjusted value** corresponds to "**the value d**",

  therefore, *for clarity*, it is suggested that **the gain value** in **line 15** be replaced with **the adjusted value**;

- **Lines 24 - 25:** per **claim 1, line 21**, suggest replacing **the digital summed R.G.B. values** with **the sum of the digital first R.G.B. value and the digital second R.G.B. value**;

- **Line 25:** per **claim 1, line 22**, suggest replacing **digital averaged R.G.B. values** with **the average of the summed digital first and second R.G.B. values**;

7. Claim 4 is objected to because of the following informalities:

- **Line 1:** per claim 1, line 6, suggest replacing **the pixel** with **each pixel**;

- **Line 2:** since the originally-disclosed claim 4 cited **250 ~ 255**, suggest replacing **250.about.255** with **250 <u>to</u> 255**;

8. Claim 6 is objected to because of the following informalities:

- **Line 2:** suggest replacing **calculating averaged compensating value** with **calculating <u>the</u> averaged compensating value**;

- **Line 8:** suggest replacing **real value** with **<u>the</u> real value**;

9. Claim 7 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 7 merely expresses equations (1) through (3) of claim 6 <u>in an equivalent matrix notation</u>. Suggest adding equation (4) and the definition of matrices A and C of claim 7 to claim 6, and cancelling claim 7.

10. Claim 8 is objected to because of the following informalities:

- **Lines 1 - 2:** per **claim 1, line 24**, suggest replacing **the step of scanning and compensating** with **the step of scanning an image and compensating the scanned image**;

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In **lines 21 - 22**, the underlined subject matter, "summing <u>the digital first R.G.B. value and the digital second R.G.B. value</u>, and further averaging <u>the summed digital first and second R.G.B. values</u>" was not properly described in the application as filed.

In the reply filed **10/21/2008**, Applicant submits that support for **claim 1, lines 21 – 22** is found in equations (1), (2) and (3) of the original specification on **page 8, lines 12 – 14** as well as **page 29** of the amendment of **4/7/2008**.

However, as noted above in the objection to the specification, support for the underlined subject matter is not taught in the cited portion of ***page 8, line 2 – page 9, line 3*** *of the application as originally filed.*

Instead, **claim 1, lines 21 – 22** appears to be based on **page 28, lines 1 - 3** of the substitute specification *which accompanied the reply filed on **4/18/2008***. However, as noted above, **page 28, lines 1 – 3** contain new matter upon which **claim 1, lines 21 – 22** is based.

As noted above, **page 8, line 2 – page 9, line 3** of the application as originally filed does not mention "*summing the R.G.B. values respectively converted from the data read from the white region and the color region of the calibration chart 16, and further averaging the R.G.B. values thereof*".

This cited portion of the original disclosure <u>does teach</u> summing "(r, g, b) *real values*" in equations (1), (2) and (3). However, the summations shown in equations (1), (2) and (3) do not correspond to "*summing R.G.B. values* <u>*respectively converted from the data read from the white region and the color*</u>

region of the calibration chart 16". The summations shown in equations (1), (2) and (3) add "real (i.e., actual) values" *which are not read, and therefore, are not converted from the data read from either the white or color regions of the calibration chart 16*.

Lastly, this cited portion of the original disclosure does not teach "averaging of the R.G.B. values thereof".

In the reply filed **10/21/2008**, Applicant further submits that "*the originally filed claims 6 and 7 describe and provide examples of summing and averaging*".

However, the originally filed **claims 6** and **7** are the equations (1), (2) and (3) which are listed on **page 8** of the original disclosure.

13. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In **lines 24 - 26**, the underlined subject matter, "referring to the digital summed R.G.B. values and digital averaged R.G.B. values, wherein said calibration of said color

image scanner is independent of a light source" was not properly described in the application as filed; in addition, the disclosure does not teach how the compensation uses the summed and averaged values.

In the reply filed **10/21/2008**, Applicant submits that support for **claim 1, lines 24 – 26** is found on **page 9, line 7** of the original disclosure as well as **page 29** of the amendment of **4/7/2008**.

> However, the equation shown on **page 9, line 7** illustrates the calculation of "real (r, g, b) values" from "sensed (R, G, B) values". The term "real values" is understood as meaning "actual values", and the term "sensed values" is understood as meaning "measured values" or values which are read by an image sensor. It is further understood that this equation refers to the step of "*compensating the scanned image*".
>
> In addition, as noted for the objection to step 119 above, the original disclosure does not teach "*summing of the R.G.B. values respectively converted from the data read from the white region and the color region of the calibration chart 16*" nor does it teach "*averaging of the R.G.B. values thereof*".

In the reply filed **10/21/2008**, Applicant further submits that "*step 123 of the exemplary method states, "then the color image scanning system processes scanning and*

compensating the scanned image referring to the summed R.G.B. value and averaged R.G.B. value" (See Specification, p. 7, line 8)".

> However, **page 7, line 8** of the original disclosure only recites, "Step 123: scanning and compensating". The description of step 123 recited by Applicant in the reply filed **10/21/2008** was added to the substitute specification which accompanied the reply filed **4/8/2008** and is considered new matter.

In the reply filed **10/21/2008**, Applicant further submits that "originally filed claim 8 provides a formula of one exemplary manner of compensating the scanned image".

> However, claim 8 merely recites the equation cited on **page 9, line 7** of the original disclosure.

Finally, as noted in the previous office action, the added claim limitation, "*independent of a light source*", would appear to be inconsistent with the disclosure since the calibration includes:

"*scanning a white region*" [**claim 1, line 3**],

"*scanning a color region*" [**claim 1, line 17**],

and "*determining if a sensed pixel value is in the predetermined region*" [**claim 1, line 14**];

One of ordinary skill in the art at the time the invention was made would assume that a "light source" would be necessary for these steps.

In summary, "*scanning an image and compensating the scanned image*" is supported per the equation on **page 9, line 7** of the original disclosure.

However, "*scanning an image and compensating the scanned image referring to the digital summed R.G.B. values and digital averaged R.G.B. values, wherein said calibration of said color image scanner is independent of a light source*" is not supported by the original disclosure.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. Claims 1 – 4 and 6 - 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **BUSHAW [US Patent 4,408,231]** in view of **YAMAZAKI [US Patent 6,480,625 B1]**.

As for claim 1, BUSHAW teaches a method for *automatically* calibrating a color image scanner, comprising:

scanning a white region of a *color* calibration chart

[BUSHAW teaches a method of adjusting a variable gain amplifier in a scanner, and cites, "The calibration of the lamp 10 and the variable gain amplifier 12 takes places while the CCD linear image sensor 18 is sensing reflected light from a white reference strip 20"; **col. 2, lines 63 – 66.** BUSHAW uses a "white color" calibration chart**];**

reading first data *of the white region*;

[BUSHAW teaches that the "first data" corresponds to a "maximum white level" which is read from the white reference strip, and cites, "During calibration, gate 28 is set to pass the maximum white signal level detected by white follower 30 to the A/D converter 16. White follower 30 monitors the amplified video signal from DC restore 26 and stores the maximum white level from the time segmented video signal"; **col. 3, lines 32 - 37];**

converting the first data *of the white region* to *a digital* first *R.G.B.* value

[BUSHAW refers to the maximum white level as a "white peak signal" and cites, "The white peak signal after it is digitized by A/D converter 16 is passed to the microprocessor 14 via the input register 32"; **col. 3, lines 39 - 41];**

amplifying a maximum value in each pixel to a predetermined region

[BUSHAW cites, "With the video signal at the saturation level, processor 14 controls the digital variable gain amplifier to adjust the 100% video signal to 100% range of the A-D converter 16"; **col. 6, lines 15 - 18];**

adjusting gain *of an optic mechanical module*,

[When sensing the "white peak signal", BUSHAW teaches a method of incrementally adjusting the variable gain amplifier until the converted analog-to-digital value reaches the "100% range of the A-D converter"; **col. 6, lines 15 – 18.** During this adjustment process, "microprocessor 14 tracks the gain of the amplifier 12 by storing a software gain DAC value at the same time it outputs an identical hardware gain DAC value to gain register 24. Thus, the incrementing operation is performed by microprocessor 14 by incrementing the software gain value and updating the hardware gain value in gain register 24"; **col. 10, lines 51 - 57]**

wherein the step of adjusting the gain includes the steps of:

determining if a current pixel value exceeds the maximum value;

subtracting *an adjusted value* from a current gain value when the current pixel value exceeds the maximum value

[BUSHAW teaches a variable gain offset determination process in **col. 9.** The currently measured pixel value corresponds to the "white follower value" (WF); **col. 9, line 65.** This pixel value is compared with the maximum value (hexadecimal 7F); in the flowchart, this step is shown as "IF WF < X'7F'". When the pixel value is not less than this maximum value, and the gain DAC value is greater than 0 (shown as, "IF GAIN DAC > 0"), the current gain value is decremented by one (i.e., a "gain adjustment value"); **col. 10, lines 65 - 67];**

adding *the adjusted value* to the current gain value when the current pixel value is smaller than or equal to the maximum value

[When the pixel value is less than the maximum value, and the gain DAC value is less than its maximum value (hexadecimal 7F; **col. 9, lines 67 – 68**; this comparison is shown in the flowchart as "IF GAIN DAC < X'7F'"), the current gain value is incremented (by a "gain adjustment value"**];**

determining if a sensed pixel value is in the predetermined region,

and adjusting *the gain value* according to a difference between the maximum value and sensed pixel value

[With reference to the "VGA Gain Set" routine illustrated in **col. 9**, and as previously noted, BUSHAW teaches determining if the digitized "white follower value" (i.e., "a sensed pixel value") is at the maximum value (hexadecimal 7F) (i.e., "in the predetermined region"), and when it is not in the predetermined region and the gain DAC value is less than its maximum value, the "gain adjustment value" is "adjusted" to a "unitary value" so that the current gain value is incremented.

This "unitary value" is the *<u>smallest difference</u>* between the "maximum value and the sensed pixel value" similar to the instant application's "<u>value d</u>" as cited on **page 7, lines 22 – 24** of the original disclosure**];**

scanning a color region of the *color* calibration chart;
reading second data *of the color region*;
converting the second data *of the color region* to *a digital* second *R.G.B.* value;

summing *the digital first R.G.B. value and the digital second R.G.B. value,* and *further* averaging *the summed digital first and second R.G.B. values*;

calculating an averaged compensating value for scanning;

and scanning <u>an image</u> and compensating *the scanned image referring to the digital summed R.G.B. values and digital averaged R.G.B. values, wherein said calibration of said color image scanner is independent of a light source*.

However, BUSHAW *does not specifically teach* "first data" being "RGB color data". In BUSHAW's scanner, the CCD is a single channel "linear array sensor containing 1728 useable photosensitive elements"; **col. 3, lines 3 – 4.**

A 3-channel CCD with separate linear array sensors for red, green and blue colors differs from a single-channel CCD in that it produces three times as much pixel data when compared to a single channel CCD and has red, green and blue filters for each linear array. However, the basic processing of each channel's pixel data from an analog value to a digital value would have been similar as for a single-channel CCD. As such, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the variable gain amplifiers for a CCD containing 3 linear arrays (i.e., one for each of 3 color channels – red, green and blue) in a similar manner as taught by BUSHAW.

In addition, since BUSHAW *does not teach* a 3-channel CCD, BUSHAW also *does not teach* the following color correction process of

scanning a color region of the *color* calibration chart;

reading second data *of the color region*;

converting the second data *of the color region* to *a digital* second *R.G.B.* value;

summing *the digital first R.G.B. value and the digital second R.G.B. value,* and *further* averaging *the summed digital first and second R.G.B. values*;

calculating an averaged compensating value for scanning;

and scanning <u>an image</u> and compensating *the scanned image referring to the digital summed R.G.B. values and digital averaged R.G.B. values, wherein said calibration of said color image scanner is independent of a light source*.

YAMAZAKI teaches a method of calibrating a color scanner. With reference to **FIG. 6A** and **FIG. 6B**, YAMAZAKI teaches a method of creating an "input density characteristic correction parameter" [**col. 15, lines 9 – 12**] which includes the steps of

scanning a color region of the *color* calibration chart;

reading second data *of the color region*;

converting the second data *of the color region* to *a digital* second *R.G.B.* value

[Fig. 6B, step **402**; YAMAZAKI teaches a “reference original” (i.e., a “color calibration chart”) that is “formed with patches of achromatic colors of various densities in the case of the reflection original scanner”; **col. 13, lines 45 – 46.** In **step 402**, the “reference original is read … and the thus read data is converted into digital image signals by the A/D converter which are subsequently sent to the density correcting subsection 50A”; **col. 14, lines 20 - 24];**

summing *the digital first R.G.B. value and the digital second R.G.B. value,* and *further* averaging *the summed digital first and second R.G.B. values*; calculating an averaged compensating value for scanning
[After the reference original is read, a “statistic such as a mean value, a median value or the like of the image signal values within the preset image region is obtained (step 403)” based on the measured result; **col. 13, lines 11 – 14.**

YAMAZAKI teaches that a “reference measured value” of the “reference original” is preferably “spectral reflectance in [the] case of the reflection reference original”; **col. 13, lines 30 – 31.** As shown in **Fig. 6A** step **302**, this “reference measured value” is “stored in the storage device 58”; **col. 13, lines 66 – 67.**

YAMAZAKI further teaches that the “input density characteristic correction parameter” of the scanner is calculated by “using the reference measured value and the previously calculated statistic” in step 405 [**col. 14, lines 40 – 43**] and is

"created as a 3x4 matrix which shows a correction value of each color, that is, an LUT for operating the density correction value using the matrix; **col. 15, lines 9 – 12.**

Specifically, YAMAZAKI teaches the relation between input R, G, B and output R', G', B' as

$R' = LUT_R\ (f_R(R, G, B))$ [**col. 15, line 16**]

$f_R(R, G, B) = \beta_0 R + \beta_1 G + \beta_2 B + \beta_3$ [**col. 15, line 19**]

and that "similar relations are found also between G and B and G' and B' respectively"; **col. 15, lines 21 – 22.**

The "3x4 matrix" consists of the "β constants" of which there are 4 per color. The "input density characteristic correction parameter" corresponds to the "averaged compensating value"**];**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of YAMAZAKI with those of BUSHAW to calibrate a "color scanner". BUSHAW teaches an initial step of calibrating the CCD sensor and adjusting the channel signal gains to maximize the use of the range of the analog-to-digital converter. YAMAZAKI teaches a subsequent step of generating a "3x4 correction matrix" that corrects the color density values sensed by the scanner.

> **and scanning an image and compensating *the scanned image referring to the digital summed R.G.B. values and digital averaged R.G.B. values, wherein said calibration of said color image scanner is independent of a light source*.**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the color scanner (i.e., “scanning”) and correct the density of the scanner RGB values by use of the “3x4 correction matrix ” (i.e., “compensating”).

Regarding claim 2, BUSHAW further teaches the method as claimed in claim 1, wherein

> **the first data of the white region or the second data of the color region is accessed by using an image sensor**
>
> **[**BUSHAW teaches that the “first data” is accessed by a “CCD linear image sensor” **18** in **Fig. 1].**

Regarding claim 3, BUSHAW further teaches the method as claimed in claim 1, wherein

> **the first data of the white region or the second data of the ~~white region or~~ color region~~, respectively,~~ is respectively converted to the digital first R.G.B. value or the digital second R.G.B. value by using an ~~analog / digital~~ analog-to-digital converter (A/D converter)**

[BUSHAW teaches the conversion of "first data" by an "analog-to-digital converter" **16** in **Fig. 1.** As noted for claim 1, BUSHAW does not specifically teach that "first data" is "RGB color data". However, as previously noted, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply an analog-to-digital converter to the separate red, green and blue channels in the same manner as for a single-channel sensor.**].**

Regarding claim 4, BUSHAW *does not specifically teach* the method as claimed in claim 1, wherein

the pixel is represented by 8 bits and the maximum value is set within 250 - 255

[BUSHAW's analog-to-digital converter has 7 bits instead of 8 bits. BUSHAW cites, "There are 128 levels in the A-D converter 16. Thus, the hexadecimal 7F represents the <u>maximum value</u> from A-D converter 16"; **col. 9, lines 62 – 64.**

Applicant's requirement of an 8-bit digital value and a maximum within 250 – 255 is a design choice. With a 7-bit analog-to-digital converter, BUSHAW teaches the same concept as taught by the applicant. It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply BUSHAW's teachings to an 8-bit converter by setting the maximum value to be 255**].**

Regarding claim 6, BUSHAW *does not specifically teach* the method as claimed in claim 1, wherein the step of calculating the averaged compensating value is performed by using a relation between a sensed value (R, G, B) and a real value (r, g, b), the relation is:

$R = a_{11} * r + a_{12} * g + a_{13} * b + C_1$ .... (1)

$G = a_{21} * r + a_{22} * g + a_{23} * b + C_2$ .... (2)

$B = a_{31} * r + a_{32} * g + a_{33} * b + C_3$ .... (3)

wherein a_{IJ} (i, j = 1, 2, 3) are relative coefficients between the sensed value and real value, and C_1, C_2, C_3 are minimum values of the sensed value.

However, as noted for claim 1, YAMAZAKI teaches a “3x4 correction matrix” that relates input R, G, B (or “sensed” – R, G, B) with output R’, G’, B’ (or “real” – r, g, b); using YAMAZAKI’s notation:

$$R' = \beta_{0R}R + \beta_{1R}G + \beta_{2R}B + \beta_{3R}$$

$$G' = \beta_{0G}R + \beta_{1G}G + \beta_{2G}B + \beta_{3G}$$

$$B' = \beta_{0B}R + \beta_{1B}G + \beta_{2B}B + \beta_{3B}$$

In matrix notation,

$$[R', G', B']^T = [X] [R, G, B, 1]^T$$

where [X] is the 3x4 correction matrix. This relation may be expressed in an alternate form,

$$[R', G', B']^T = [Y][R, G, B]^T + [Z]$$

where [Y] is a 3x3 correction matrix and [Z] is the 3x1 matrix $[\beta_{3R}, \beta_{3G}, \beta_{3B}]^T$. Solving for input (or "sensed") R, G, B

$$[R, G, B]^T = [Y]^{-1} [R', G', B']^T - [Y]^{-1} [Z]$$

where $[Y]^{-1}$ is the matrix inverse of [Y].

Using the instant application's notation for "real RGB values" (r, g, b) in place of (R', G', B') yields

$$[R, G, B]^T = [Y]^{-1} [r, g, b]^T - [Y]^{-1} [Z]$$

As shown, when the "actual" or "real" RGB values $[r, g, b]^T$ are $[0, 0, 0]^T$ (corresponding to a black color), the "input" or "sensed" RGB values $[R, G, B]^T$ are equal to $(-[Y]^{-1}[Z])$ which are "minimum values of the sensed values". That is, $(-[Y]^{-1}[Z])$ corresponds to the instant application's $[C_1, C_2, C_3]^T$.

Regarding claim 7, BUSHAW *does not specifically teach* the method as claimed in claim 6, wherein the equations (1) - (3) are expressed via matrices as following:

$$\mathbf{[R, G, B]^T = A [r, g, b]^T + C} \ \ldots\ldots\ \mathbf{(4)}$$

wherein matrices A and C are written as:

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \quad C = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \end{bmatrix}.$$

Equation (4) above is simply the ***equivalent*** matrix notation of equations (1) to (3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to re-write equations (1) to (3) in matrix notation as this format is typically used to solve simultaneous equations.

Regarding claim 8, BUSHAW *does not specifically teach* the method as claimed in claim 7, wherein the step of scanning and compensating is performed by using an inverse function of equation (4) as:

$$[\, r, g, b \,]^T = A^{-1} ([\, R, G, B \,]^T - C)$$

whereby the real value (r, g, b) is obtained.

Note that this equation is a derivation of equation (4) cited in claim 7; the difference being that the “real values” (r, g, b) are calculated by means of an inverse matrix $\mathbf{A}^{-1}$.

As noted for claim 6, YAMAZAKI teaches a relation between input R, G, B (or “sensed” – R, G, B) and output R’, G’, B’ (or “real” – r, g, b).

In matrix notation,

$$[R', G', B']^T = [X]\,[R, G, B, 1]^T$$

where [X] is the 3x4 correction matrix. This relation may be expressed in an alternate form,

$$[R', G', B']^T = [Y]\,[R, G, B]^T + [Z]$$

where [Y] is a 3x3 correction matrix and [Z] is the 3x1 matrix $[\beta_{3R}, \beta_{3G}, \beta_{3B}]^T$.

Using the instant application’s notation for “real RGB values” (r, g, b) in place of (R’, G’, B’) yields

$$[r, g, b]^T = [Y]\,[R, G, B]^T + [Z]$$

which is of the same form as claimed by the instant application.

Response to Arguments

17. Applicant's arguments filed **10/21/2008** have been fully considered but they are not persuasive.

Regarding Applicant's argument that

the Examiner failed to address the first argument asserted in the Amendment filed on April 7, 2008, in response to the Office Action of December 10, 2007. Specifically, the claims of the present invention are directed to methods for calibrating of a color image scanner "wherein said calibration of said color image scanner is independent of a light source".

In reply:

Although BUSHAW calibrates the light source to "bring the image sensor 18 to the saturation point", BUSHAW also teaches that "*alternatively, the microprocessor could change the sampling interval for the photosensors in the array until the array saturates*"; **col. 2, lines 13 – 15.** After the light source has been calibrated or the sampling interval has been adjusted, BUSHAW teaches a procedure (VGA Gain Set) for setting the gain of the variable gain amplifier.

In a similar manner, the instant application teaches adjusting the "gain" of a "converting circuit of an optic mechanical module" with a "feedback loop so that

the quality of the output color from the image scanning system can be retained" at "a predetermined level"; **page 3 (**of the original disclosure**), lines 8 – 11.** Applicant further teaches that the "converting circuit" may be an analog-to-digital converter; **page 5 (**of the original disclosure**), lines 10 – 11.**

Regarding Applicant's argument that with reference to BUSHAW's teachings in **col. 3, lines 39 – 41**,

"*It is unclear whether the described conversion of the first data to a digital value is part of the calibration process or whether it occurs afterwards*".

In reply:

BUSHAW teaches in **col. 3, line 32**, that the digitization of the "white peak signal" occurs "during calibration".

Regarding Applicant's argument that BUSHAW does not describe

"*adjusting the gain value according to a difference between the maximum value and the sensed pixel value*"

In reply:

As noted in the claim rejection, BUSHAW teaches that when the digitized "white follower" (i.e., "a sensed pixel value") is not at the maximum value (i.e., is not in the "predetermined region") and the gain DAC value is less than its maximum

value, the “gain adjustment value” is “adjusted” to a “unitary value” so that the current gain value is incremented.

This “unitary value” is the *smallest difference* between the “maximum value and the sensed pixel value” similar to the instant application’s “value d” as cited on **page 7, lines 22 – 24** of the original disclosure.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- **MORIYA [US Patent 5,191,623]** teaches the ability of a microprocessor to separately set A/D converter reference voltages for each of the red, green and blue channels; **col. 5, lines 15 – 23**;

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter L. Cheng whose telephone number is 571-270-3007. The examiner can normally be reached on MONDAY - FRIDAY, 8:30 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, King Y. Poon can be reached on 571-272-7440. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/King Y. Poon/
Supervisory Patent Examiner, Art Unit 2625

plc
December 18, 2008